# Auto-MOS
## Operating System Generation Program Notes
February 1986

## Auto-MOS: MOSB3 EPROM Generation Program

Auto-MOS is a disk-based Machine Operating System generation program for EuroBEEB MOSB3. It consists of a 3.5" or 5.25" 80-track disk (40-track 5.25" version available on request) which runs on the BBC Micro or on 32 KByte EuroBEEB systems. It is available as part of the EuroBEEB Development Pack, or as a seperate item. Please consult the latest price list for details of prices.

## Why Auto-MOS?

### (i) The problem

EuroBEEB has a machine operating system (MOS) which is contained in a 16KB EPROM. This amount of memory has been found to be insufficient to support both the CUBE range of peripheral cards and the variety of system configurations required by the user. In the past this has meant that a series of standard MOS versions have been produced, for example, version 'C' supporting CU-GRAPH, 'T' supporting TELETEXT, 'J' supporting JOBBER or 'M' supporting a machine code monitor. It then became necessary to subdivide these four major types into versions supporting different keyboards, CPU clock frequency et cetera. The proliferation of MOS variants has now reached the stage where it is no longer feasible for Control Universal to stock and supply all such MOS variants on EPROM.

### (ii) The solution

To overcome this problem, all EuroBEEBs are now supplied with MOSB3 with the machine code monitor. For many customers this will be adequate. However, Control Universal now provide the option of purchasing the Auto-MOS disk which enables the user to configure a MOS tailored to his/her requirements.

## How does Auto-MOS work?

Auto-MOS is a BASIC program supplied on a disk which also contains a set of machine code modules, a selection of which are to be incorporated into the user's MOS. This program prompts the user with a series of questions relating to the configuration of the EuroBEEB system required. These questions are discussed in detail later in the text. When all the questions have been answered and, providing the answers pass a validation check (to ensure that a sensible MOS can be produced), a 'target' file is constructed from the machine code modules contained on the disk. This file is then stored on disk so that the user can then blow a 16KB EPROM from this file with a standard EPROM progammer. This EPROM contains the new MOS.

## How is Auto-MOS supplied?

Auto-MOS is supplied in the following formats;

3.5" 80-track single density
5.25" 80-track single density

in standard BBC Micro format. The program will run on both the BBC Micro itself or on a EuroBEEB (32KB) system with its own disk drives.

What are the default conditions on EuroBEEBs with MOSB3?

The default conditions are:

| | |
|---|---|
| CPU frequency | 1 MHz |
| Input Channel | Serial |
| Output Channel | Serial |
| Serial Filing system Active? | Yes |
| Supplementary Keyboard | None |
| Peripheral Driver or Monitor | Monitor |
| RAM type for sideways storage of ADC SAMPLEs | CU-MEM Selecta |
| ADC driver | CUBAN-12B, CUBAN-8 |
| Turnkey line | None |
| NETWORK Station Number | 0 |

NOTES

(i) The Serial Filing System is active with the serial port defined as both the input channel and the output channel. This means that the BBC micro (fitted with *EURO) can be used as a terminal/fileserver.

(ii) EuroBEEBs which are purchased as part of a SYSTEM, for example a Jobber system, will have the correct MOS inserted by Control Universal during the system configuration stage of the production process.

## Auto-MOS Options

### General

The program expects all answers from the keyboard to be followed a carriage return. For certain options the program will choose a default value if the user types in a carriage return.

### Option 1: CPU Crystal Frequency (1 or 2 MHz)

There are two versions of EuroBEEB which run with clock frequencies of 1 and 2 MHz respectively. In order that certain time related functions within EuroBEEB (such as TIME in BASIC and SAMPLE in Real-Time or Control BASIC) operate correctly, the operating system must make allowance for the actual clock frequency.

Note that the following cards will NOT operate at 2 MHz:

| | |
|---|---|
| CU-GRAPH | Colour Graphics card |
| CUBAN-8 | Universal 8-bit Interface card |
| CY-DRAM | Paged Dynamic RAM card (now obsolete) |
| CU-DRAM | 64KB Dynamic RAM card (now obsolete) |

All other cards in the CUBE range are capable of running at 2 MHz but they must be fitted with 2 MHz parts (e.g. 6522A for the VIA). All new CUBE cards capable of running at 2 MHz are fitted with 2 MHz parts although this may not be case with older cards.

### Option 2: Peripheral Driver or Monitor

There are four possiblities:

The three peripheral drivers are CU-GRAPH, JOBBER or TELETEXT or alternatively the Machine-Code Monitor can be included.

NOTE: If the facilities of a machine code monitor are required with any of the three peripheral drivers, then SIDEMON, an expanded machine code monitor which runs in sideways memory, can be be introduced into the system. SIDEMON requires a sideways memory carrier such as CUMEM Selecta (sideways memory card), DOUBLESTORE (disk controller) or IEEE interface card.

## Option 3: System Keyboard (CU-KEY-99 or CU-KEY-53)

Note: This Option is NOT available when the Monitor is selected in option 2.

CU-KEY-99 is a 99 key, interrupt-driven keyboard which works in a similar manner to the keyboard on the BBC Micro. This option also provides for the use of the NEW style (as currently supplied) CU-KEY-25. Both of these keyboards require an interface which may be: (i) the 'Keyboard Interface', (stand alone board), (ii) the 'Rack-mounted Keyboard Interface' or (iii) the Jobber interface card. If the Keyboard Interface is used, then the keyboard ribbon cable is taken to the 26-way connector on the front panel of the CPU card. If the second or third alternative is used, the cable plugs into the connector on the front of the Euorcard card. CU-KEY-53 is an obsolete, scanned keyboard which must be connected into the CPU card. This Keyboard cannot be used with current Jobber cards.

## Option 4: Bulk Memory Type for SAMPLE (Selecta or CY-DRAM)

The Control BASIC (Real-Time BASIC) command SAMPLE, when used with either of the ADC cards CUBAN-8 or CUBAN-12B, provides the facility of storing the samples taken in sideways RAM. The two options provided are for CU-MEM Selecta, which can have 64KB of battery backed CMOS static RAM in four 16KB pages, or CY-DRAM which has 64KB of dynamic RAM in 16KB pages.

Note: CY-DRAM, which is has been superceded by CUMEM Selecta, will only operate at 1 MHz.

## Option 5: Turnkey Line

Auto-MOS will insert the user's turnkey line into the MOS. This means that when the EuroBEEB target is turned on, a program already resident in the program memory area (which itself may be RAM or EPROMed: see the EuroBEEB manual for details) can be executed. For example the turnkey line OLD |M RUN |M is a required for a battery-backed RAM BASIC program. Alternatively, the turnkey line PAGE=&4000 |M RUN |M would be used for an EPROMed BASIC program. HIMEM and LOMEM will have to be set (in the BASIC program itself) to use RAM.

NOTE: A maximum of 20 characters is allowed in the turnkey line.

## Option 6: Network Station Number

When several EuroBEEBs are networked together using Control NET level 1, each station must have a unique station number. If the <return> key is pressed then the network station number assigned is zero.

## Option 7: Power On conditions

The default power on conditions are that the Serial Filing System is active with the serial port defined as both the input channel and the output channel. This may not be conveient for some users, for example, a user with CU-KEY-99 keyboard plugged into the processor card, but with no BBC Micro available, will not be able to communicate with the processor from the keyboard until the input stream is changed from serial. This may be done using the turnkey line, but it is more convenient to change the initialisation table in the MOS to produce the required conditions. The MOS is amended automatically by the Auto-MOS program.

Note also that the turnkey line is not executed until after the completion of the initialisation procedure. This can cause problems under certain circumstances. For example, if the EuroBEEB serial port is connected to another device. In this case the start-up message will be directed to the serial port and may cause problems at the other end of the serial link!

### (i) Input Type

This is equivalent to *FX2,X where X defines the input type.

X=0 Keyboard selected, Serial not selected
(handshake='Busy')
X=1 Serial Port selected (default)
X=2 Keyboard AND Serial selected
(handshake='Not Busy')
X=3 ASCII-and-Strobe keyboard (PA + CA1)

The option X=3 is specifically for those users who wish to purchase their own ASCII-and-Strobe keyboard.

## Option 7: Power-On Conditions (continued)

### (ii) Output Type

This is equivalent to *FX3,X where X defines the output channel
X=0 Video channel (CU-GRAPH or TELETEXT)
X=7 Serial port (default)

### (iii) Serial Filing System and the Network

If the serial filing system is switched ON (intended for communication with a BBC Micro fitted with a *EURO EPROM) then the code &9B has a special meaning and serial filing system commands will be prefaced by this character. If a &9B is to be sent as data it is also prefaced with a &9B so that the bytes following will not be mistaken for serial filing system commands. If normal transmission is required (say to another serial device) then the serial filing system should be switched OFF. Similarly, &9A is a network command code and, again if normal transmission is required this must also be switched OFF.
NOTE: OSBYTEs 181 and 183 can be used to turn the terminal driver and the serial filing system ON/OFF (see EuroBEEB manual and Advanced User Guide p.190)

### (iv) Machine code jump

If EuroBEEB is required to start-up and immediately execute a machine code programon start-up instead of a language, then the start address should be entered here in hexadecimal, high byte, low byte and without an '&'. eg. if a start address of &2A88 is required the user should enter;

```
        2A88
```

## Production of the File

The file containing the object code of the MOS will be stored on drive 2, unless the user specifies another drive in response to the prompt;

```
        Enter new filename if required
```

For example, if the user wished to name the file 'Z.Target' and save it on drive 0, then the following filename should be entered here;

```
        :0.Z.Target
```

If the user responds with a carrriage return, the program will be stored on side 2. (This is because there is much more disk space on side 2 for user configured MOS versions).

## *EURO

This is the 8kB (nominal) object file of the *EURO ROM for the BBC Micro. This ROM will be compatible with all versions of the MOS that can be obtained from this AutoMOS disk. Please consult the *EURO documentation to find out if this version of the *EURO requires a pull-up resistor to be fitted on the RS423 port of the BBC Micro

## EPROM types

A suitable EPROM type for the 16KB of the MOSB EPROM is a 27128 or direct replacement.
*EURO being only 8KB long only requires a 2764 EPROM (although a 27128 would also be suitable).

End.